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ABSTRACT

The Student Learning Scales (SLS) were intended to supplement or replace existing college instructor performance scales, by focusing on the actions of learners and by providing students with an instrument for assessing their own learning reactions in a variety of instructional contexts. Factor analyses and validity studies were conducted to develop and refine the SLS. The factors indicated by the factor analytic studies--appropriate teaching method, liberal learning, social learning, analytical thinking and problem solving, motivation and relevancy, and writing--were examined in relation to students' majors: humanities, social science, natural science, business, and learning analysis. (Results are included, as well as various forms of the 94-item rating scale). (Author/GDC)

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THE STUDENT LEARNING SCALES,

A PROGRESS REPORT

The Student Learning Scales are intended to supplement or replace existing college instructor performance scales by focusing evaluative attention on the actions of learners and to provide students with an instrument for assessing their own learning reactions in a variety of instructional contexts. This report describes results through Stage IV of a five-stage model for their development, including a scheme for defining student learning reactions, a test of the feasibility of the SLS, factor analytic studies describing the psychological structure of college students' learning reactions, and validity studies. The Stage V SLS are included.

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I. Background

A. Purpose and Rationale

The development of the Student Learning Scales (SLS) is a major goal of the University of Nebraska FIPSE project "Helping Students Become More Sophisticated Consumers of Their Own Education." K. P. Cross, project author, describes them as follows:

> "The SLS are designed to focus evaluative attention on the actions of learners rather than teachers. The rationale for the SLS is that ultimately the effectiveness of teaching is measured in the responses of learners. Instead of the familiar teacher-action items of 'The instructor makes course objectives clear,' or '...presented the material in an interesting manner,' the SLS might present a mirror image in the form of 'I knew what I was attempting to accomplish in this course,' or 'I was eager to learn more about the subject.' Since the SLS have the dual purpose of evaluating learning and improving teaching, analytical items that help instructors evaluate student reactions will be emphasized such as 'I made great gains in conceptual understanding,' or 'My intellectual curiosity was greatly stimulated.'" (Cross, 1976).

In summary, the SLS are intended to supplement or replace existing instructor performance scales, as well as to provide students with a tool for assessing their own reactions to learning experiences.

The emphasis of the SLS is on assessing the outcomes of learning experiences rather than assessing learning processes or instructor behaviors. They are intended to supplement the instructor's knowledge of his/her own teaching behavior and of student achievement on examinations and in doing so, to help improve instruction by assessing academically valued outcomes. There are four advantages of assessing outcomes rather than processes or instructor behaviors.

First, students are asked to evaluate that which they know well, their own learning responses, rather than that which they do not know well (e.g. Professor's breadth of content knowledge), and may be helped through experience

with the SLS to take increased responsibility for their own outcomes. Hoyt (1977, pp 8-9) presents a review of student accuracy in self-appraisal of academic outcomes. He concludes that students can assess gains in learning with reasonable accuracy and that differences between class averages are meaningful if rating errors are not systematic.

Second, faculty receive descriptions of student outcomes from the learners themselves, helping them to assess teaching effectiveness and to become more sensitive to unintended outcomes and to the quality of the student learning experience.

Third, instructional effectiveness is ultimately determined by learner outcomes, which are themselves multiply determined. The SLS recognize the potential uniqueness of each teaching-learning encounter in comparison to the more traditional instructional evaluation tools which focus evaluation on a consensually valued set of instructor behaviors. This orientation of the SLS is shared in part by two of the more recently developed instructor evaluation systems which also recognize the potential uniqueness of each course: IDEA (Hoyt, 1977) which requires students to rate their progress on ten general objectives and adjusts teacher ratings based on the relative importance of these objectives for a given course; and ICES (University of Illinois, 1978) which includes one section on student outcomes in the item pool of this cafeteria type instrument. Thus, the SLS join IDEA and ICES (and other cafeteria type instruments) in meeting the needs of faculty who object to traditional evaluation tools which disregard the variation in objectives, methods, and participant characteristics which influence the course of instruction and instructional outcomes.

Fourth, the variation in instructional outcomes sought by courses in different academic areas provides a means for assessing the criterion group validity of the SLS by comparing results from courses seeking similar or different kinds of student outcomes.

B. The Five-Stage Development Model

A five-stage model for development of the SLS was created in spring, 1977. This progress report briefly summarizes the activities of Stages I and II (through fall, 1977), describes the results of Stages III and IV (spring, 1978 through summer, 1979), and outlines the goals and activities of Stage V (spring, 1979). Stages I and II were concerned with elaboration and clarification of the concept of a student learning reaction and with testing the feasibility of the SLS. Stage III was primarily concerned with development of the item set, description of the structure of student outcomes, and initial validity studies of the SLS. Stage IV emphasized refinement of the SLS, cross-validation, and further validation studies. Stage V establishes initial norms and relationships to course and student characteristics.

II. Review of the Initial Feasibility Study, Stages I and II.

A literature review established that there was little precedent in theory or instrumentation for the SLS. Accordingly, the tasks of these stages were to generate a schema for defining student learning reactions and writing items, and to test the feasibility of the SLS. The schema involved using the following four perspectives to focus on learner outcomes and then to write items reflecting them. There was a general perspective including models of human learning (Bloom, Gagne), psychological theories of learners (operant, cognitive, humanist, psychoanalytical), teacher evaluation scales (mirror image items based on common factors found in a review of these scales), and rational models (skills, attitudes, and values relevant to higher education). Perspectives based on learning reactions specific to instructional strategies (e.g. Keller Plan, lecture, discovery), to disciplinary goals (e.g. natural sciences, fine arts), and to models of cognitive or learning styles (e.g. field independence-dependence) were also included. The schema was intended to be as broad as possible and overlap across perspectives was anticipated (Note 1). The perspectives included indicate some of the directions later construct

validity studies may take. Outcomes were emphasized as contrasted to experiences or processes because they were viewed as the most relevant aspect of student learning experiences and the most open to validation.

The initial feasibility study focused on items based on Bloom's Taxonomy of cognitive and affective objectives and goals specific to Learning Analysis (LA), a second major component of the FIPSE project (Note 2). A 51-item scale was developed and administered to students in two LA and six other classes (N=179) on two campuses of the University of Nebraska at the end of the semester. Students were asked to rate the degree to which the statements in the scale "described your learning experience in this course" on a five-point Likert-type scale. Item writing and selection was facilitated by critical comments from LA faculty and students. Results including the original scale are presented in detail elsewhere (Finkler, 1978) and briefly summarized here. Reliabilities for the full scale, a subscale of 14 items specific to the goals of LA, and the remaining 37 items treated as a general education subscale were computed separately for LA and non-LA classes at each campus and were all high ($\alpha_s \geq .856$, Mdn. $\alpha = .922$). Mean scores on LA and general education subscales varied as expected for LA and non-LA classes (Ps $< .001$), establishing the criterion group validity of these subscales. Additionally, groups of items considered "relevant" or "irrelevant" to course goals for each of three non-LA classes were identified by the instructors. T-tests of differences between means of these subscales were all significant (Ps $< .05$), indicating again that responses to the SLS discriminated between different kinds of outcomes for different courses and that it was feasible to proceed with an elaboration of the SLS.

III. Scale Development, Stage III

A. Item Selection

The schema developed earlier was used to generate 222 statements reflecting student outcomes for potential use in the SLS. In an effort to reduce the item pool, 18 non-LA faculty members from four midwestern colleges and universities representing diverse disciplinary perspectives were asked to do a modified Q-sort of the items into two groups, those relevant or irrelevant to courses in the faculty member's academic area. Results of the Q-sort (e.g. overlap of item choices, types of items chosen, etc.) provide a unique perspective on faculty values regarding learning. As an item reduction technique, however, the Q-sort was not effective. The mean and median numbers of items chosen as relevant were 151 and 161. Therefore, after eliminating poorly written items, obvious redundancies, and including the most frequently chosen items, the 182-item pool was sorted into two groups and alternate forms of the SLS prepared (Appendix B). Instructions were modified to allow students to rate a statement "0" if an item did not apply to their course and from "1" (hardly ever true) to "5" (almost always true) otherwise.

B. Factor Analyses

The SLS was administered to four LA and 15 other courses at four midwestern colleges and universities. Forms A and B were distributed in alternate sequence within each class. Total useable sample size was 520 after elimination of about 40 patterned responses or response sheets missing Forms A or B designations. Factor analytic studies of responses on the SLS were performed to describe the psychological structure of the learning outcomes measured by the SLS. The procedures used in comparing Forms A and B follow those used by Brandenburg, et.al. (1978) in development of ICES. Each of the Forms A or B factor analyses were performed on 270 responses before pairwise deletion of any respondent with missing data. Item response omissions were rare throughout the data set.

Exploratory factor analyses were performed on responses from Form A using squared multiple correlations as the diagonal elements. Thirteen factors with eigenvalues greater than one were extracted, accounting for 80.4 percent of the variance. Based on Cattell's Scree test, an eight-factor solution was chosen for further exploration. Both orthogonal and oblique rotations were performed and found to overlap considerably. Furthermore, intercorrelations among oblique factors were low. Accordingly, all further factor analyses were orthogonal. Pragmatic considerations suggested exploration of 6, 7, and 10 factor solutions which also overlapped considerably. Several of the factors which accounted for small amounts of the explained variance were composed of only one or two variables or lacked interpretability. Accordingly, a six-factor orthogonal solution rotated to the variamax criterion was adopted as most easily interpretable for Form A.

The same type of factor analyses were then conducted on responses to Form B. The initial solution identified thriteen factors accounting for 75 percent of the variance. Cattell's Scree test indicated that a maximum of eight factors be retained. Exploratory orthogonal and oblique, and 6, 7, and 10 factor solutions were performed. A seven-factor solution rotated to the variamax criterion was adopted as most easily interpretable for Form B.

The Form A solution accounts for 36.64 percent of total variance, that for Form B accounts for 35.35 percent, similar to results found by Brandenburg, et.al. (1978) for ICES. Table 1 demonstrates the factor overlap among major alternative orthogonal solutions for both forms.

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Insert Table 1 here

- -

The factor names, eigenvalues, and percent of common variance accounted for by each factor as presented in Table 2 for both Forms A and B. Starred factors occur on both forms.

Table 1

Factor Overlap Among Alternative Solutions

	Form A				Form B			
	Number of Factors in Solution				Number of Factors in Solution			
	6*	7	8	10	7*	6	8	10
Factor	1	1	1	1	1	1	1	1
Name	2	2	4	2	2	2	4	2
Based	3	3	2	3	3	3	2	3
on	4	4	3	4	4	4	3	4
Final	5	5	6	5	5	5	7	7
Solution	6	6	5	6	6		6	6
		7	7	7	7	6	5	5
			8	8			8	9
				9				8
				10				10

* Number of factors in final solution

Insert Table 2 here

Number of items loading greater than |.30|, the five highest loading items and several others which illustrate the item loading range are presented in Table 3. Inspection of these factors and item loadings suggests that the SLS are measuring the kinds of outcomes which are important to students and faculty in higher education.

Insert Table 3 here

Table 2

Factor Structures

Factor Name	Eigenvalue	Percent of Common Variance
Form A		
* Social Learning	8.20	24.60
* Appropriateness of Teaching Method	8.11	24.32
Content Relevancy (Negative)	6.17	18.56
Analytic Thinking	4.89	14.66
* Academic Skill Development	3.14	9.41
Receptivity to New Ideas/Liberal Learning	2.82	8.45
Form B		
Fact and Concept Learning	6.19	21.02
* Social Learning	5.73	19.45
Enthusiasm for Learning	5.42	18.42
Synthetic Thinking	4.98	16.91
* Appropriateness of Teaching Method (Negative)	4.34	14.76
Problem Solving	2.78	9.43
* Academic Skill Development	2.73	8.50

Table 3

SLS Factor Loadings

Item	Load
Form A	
I: Social Learning	33 items load ≥ .30
Working with other students in this class has been an important part of my learning experience.	.67539
In this class I have come to value open communication between people.	.64731
I have developed a greater awareness of other people's values in this class.	.59037
I enjoyed being evaluated on the basis of what I could do rather than what I remembered.	.58943
I've come to appreciate how different people learn in this class.	.58750
- - -

Item	Load
III: Content Relevancy (Negative)	20 items load $\geq \lvert .30 \rvert$
I did not understand the objectives of this course.	.65312
I don't understand how this subject matter applies to the real world.	.61974
What I learned in this course was trivial and unimportant.	.61676
I was not motivated to participate in class.	.57169
I did not gain a solid mastery of the factual content of the subject in this course.	.56925
- - -

Item	Load
In this class, I've further developed my skill in reading and analyzing written material.	.41676
In this class, I've become a better critic of my own and other's artistic performances.	.39777
- - -

Item	Load
II. Social Learning	19 items load ≥ |.30|
I was able to work effectively with other people in this course.	.62446
I have enjoyed learning from the other students in this class.	.60940
I felt free to discuss topics with the other students in this class.	.55475
I have developed a sense of community with other students in this class.	.54702
In this course, I was able to recognize the varied ways by which other people learn.	.49333
- - -

Item	Load
I have developed problem solving strategies which are useful in this field.	.44452
- - -

Item	Item
When writing a term report for this class, I had difficulty organizing the material logically.	.51630
I was able to develop my creative abilities in this class.	.45190
Writing reports did not help me to understand this subject area.	.44933
I had difficulty using the library effectively to help me with my class project or term report.	.42306
In this class, I've become more skilled at backing up my arguments with data and/or documentation.	.42102
In this class, I enjoyed reading a greater variety of materials than I usually do.	.37448

C. Validity Studies

The initial validity studies conducted focused on the item pool and were concerned with determining if responses to the SLS discriminated between different kinds of outcomes for different courses. In the absence of objective measures of student attainment of the outcome referred to by each statement in each course, only an indirect test of validity is possible. The indirect test involved comparing students' reports of outcome attainment on items instructors identified as relevant or as irrelevant to their courses. Students should assess their achievement of outcomes higher on those items instructors identify as course relevant than on those instructors identify as irrelevant to the course. Accordingly, instructors were asked to identify ten course-relevant and ten course-irrelevant outcomes on each of the SLS forms, and students enrolled in the course were given scores on each of these subscales. Half of the students responded to Form A and half to Form B so two comparisons per class were possible, one for each form of the SLS. Table 4 presents the results for the ten instructors who identified relevancy subscales. Means are resported as item averages with a possible range from 0 to 5. Item rather than subscale means are reported to facilitate columnwise comparisons, since some instructors identified more or less than 10 items for each subscale. Note that the t-tests for matched groups (relevant and irrelevant subscale scores for each student) should be statistically significant only if the teaching was effective, instructors identified relevant and irrelevant outcomes in a manner consistent with instruction, and student ratings of outcomes were valid. If any of these assumptions are incorrect, then the t-test would not be significant.

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Insert Table 4 here

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Table 4

T-Tests Between Outcome Ratings on Relevant and Irrelevant Item Subscales

Instructor/ Course	Relevant $\bar{X}$	Relevant SD	Relevant #Items	Irrelevant $\bar{X}$	Irrelevant SD	Irrelevant #Items	N	T	p*
Form A									
A	4.20	.283	10	2.50	.849	10	2	2.13	.1400
B	3.54	.598	10	.86	.756	10	14	15.47	.0005
C	3.60	.589	10	2.27	.439	10	7	4.98	.0015
D	3.71	.825	10	2.59	.629	10	16	6.24	.0005
E	3.39	.728	10	2.78	1.068	10	25	2.28	.0160
F	3.61	.741	10	2.13	.742	10	33	10.02	.0005
G	4.02	.566	10	3.14	.847	10	23	7.42	.0005
H	3.40	.216	10	2.65	.265	10	4	3.22	.0240
I	4.02	.253	9	2.94	.521	16	5	4.50	.0055
J	3.74	.853	10	2.69	.728	10	10	3.90	.0020
Form B									
A	4.75	.177	8	2.38	.530	8	2	9.50	.0335
B	3.58	.721	10	.52	.410	10	14	13.21	.0005
C									
D	3.30	.661	10	2.68	.609	10	17	4.75	.0005
E	3.66	.610	10	2.76	.628	10	30	6.92	.0005
F	3.22	.564	10	2.01	.511	10	32	11.69	.0005
G	4.07	.440	10	3.16	.607	10	21	6.94	.0005
H	3.22	.665	10	2.32	.778	10	6	2.05	.0475
I	3.71	.875	9	2.28	.560	24	8	5.63	.0005
J	3.80	.583	10	3.00	.452	10	6	3.10	.0135

* one-tailed

Of the nineteen tests performed (one instructor did not identify subscales for Form B), eighteen are statistically significant at $p < .05$ and thirteen at $p < .01$. The one non-significant result had a very low N=2. Inspection of the subscale means shows that relevant item means ranged from 3.21 to 4.75, all above the item range midpoint of 2.5. Irrelevant item means ranged from .52 to 3.16, with eleven of the nineteen equal to or greater than the item range midpoint of 2.5, suggesting some negative skew in the responses, perhaps representing learning outcomes experienced by students but not valued by instructors, or a tendency to endorse items positively.

An additional approach to validity is made possible by comparing criterion group factor scores on the SLS. Such tests can provide support for the initial factor structure and enrich its interpretation. Since courses in different disciplines or academic areas have different emphases and values regarding student learning outcomes, they may serve as criterion groups expected to score differently on the factor scales. Courses in the natural sciences, for example, would be expected to emphasize analytic thinking and problem solving as compared to social learning or academic skill development (reading and writing), whereas courses in the humanities would be expected to emphasize academic skill development as compared to problem solving or social skills. Accordingly, factor scores were calculated for each of the factors identified earlier for all students. Standardized course means were calculated for each factor ($\bar{X}=0$, SD=1) based on the factor score distribution of all students responding to each form of the SLS. Factor score means, standard deviations, Ns, ranks, and academic areas are presented in Appendix B for each of the 19 courses participating in the study. There are four education, four Learning Analysis (LA), two business administration, two social science, five humanities, and two natural science or mathematics courses in each of the six academic areas considered.

One-way analyses of variance were conducted over the six academic areas using factor scores as the dependent measures. The more appropriate design recognizes courses as nested within academic areas. The assumptions of this ANOVA model require an equal number of courses nested within each academic area, an assumption not met in this data. The one-way unnested ANOVA provides a conservative test of the effect of academic area under these conditions. If the nested effect B/A were statistically significant, then the error term in the simpler one-way design would be enlarged, providing a conservative test of the effect of academic area. If it were not significant, then the error term in the simpler model should be the same. Change in error term degrees of freedom (Form A df = 247, Form B df = 259) is trivially affected.

Tables 5 and 6 present the standardized factor score means, Fs, and Ps, and results of t-test comparisons among means. Note that the t-tests are two-tailed and that more differences would be noted under the less conservative one-tail tests which could be used on some factors. The great majority of the t-tests were significant at $P < .01$. The presentation of the t-test results is in near-prose form to simplify comparisons.

Table 7 presents the average ranks of courses within academic areas for each factor. Results based on the mean of course ranks are similar to those from the analyses of variance.

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Table 5

Means and F Ratios for Six Academic Areas on the Factor Scales

Factor Name	Academic Area: Business	Education	Humanities	LA	Nat.Sci.	Soc.Sci.	F	P
Form A								
Social Learning	.0816	.5765	-.2420	.4939	-.6737	-1.2871	18.31	.001
Appropriate Tchg. Method	.2152	-.0116	.0902	-.6212	.3052	.3425	5.61	.001
Content Relevancy (Neg)	.1488	-.1118	.1708	-.0794	-.1996	- .7091	2.69	.022
Analytic Thinking	.1688	.5981	-.6782	.1496	.8029	.5143	28.36	.001
Academic Skill Development	-.3587	-.4050	.4833	-.0198	-.6037	.0742	13.15	.001
Liberal Lrng.	.2994	-.2825	.0522	.0298	-.5989	.6614	5.52	.001
Form B								
Fact/Concept Learning	-.0250	.0821	.0442	-.5054	.3326	.2480	3.56	.004
Social Learning	-.0304	.7195	-.1942	-.5713	-.6761	-1.0298	23.26	.001
Enthusiasm for Learning	-.1567	-.0905	-.0127	-.0938	.1077	.7282	2.74	.020
Synthetic Thinking	.3447	.1339	-.4626	-.4669	.0963	.4864	11.55	.001
Appropriate Tchg. Method (Neg)	-.1178	.1556	-.0129	-.0992	.0873	.0557	.53	.755
Problem Solving	.1336	.5263	-.5019	.2318	.9868	- .6119	26.35	.001
Academic Skill Development	.1453	-.4154	.3828	.0661	-.7971	- .5186	13.33	.001

Table 6

Significant Differences Between Academic Areas on the Factor Scales *

Factor Name	
Form A	
Social Learning	Education, LA > Business > Humanities > Nat.Sci., Soc. Sci.
Approp. Tchg. Method	Soc. Sci., Nat. Sci., Business, Hunamities, Education > LA
Content Relevancy (Neg)	Humanities, Business, LA, (Education, Nat. Sci.) > Soc. Sci.
Analytic Thinking	Nat. Sci., Education, (Soc. Sci.) > Business, LA > Humanities
Acad. Skill Develop.	Humanities, (Soc. Sci.) > LA, (Business, Education) > Nat. Sci.
Liberal Learning	Soc. Sci., (Business) > Humanities, LA > Education, Nat. Sci.
Form B	
Fact/Concept Lrng.	Nat. Sci., Education, Humanities, Business > LA
Social Learning	Education, LA > Business, Humanities > Nat. Sci., Soc. Sci.
Enthusiasm for Learning	Soc. Sci. > Nat. Sci,, Education, LA, Humanities, Business
Synthetic Thinking	Soc. Sci., LA, (Business) > Nat. Sci., Education > Humanities
Approp. Tchg. Method (Neg)	
Problem Solving	Nat. Sci. > Education > LA, Business > Humanities, Soc. Sci.
Acad. Skill Devel.	Humanities, (Business) > LA > (Education) > Soc. Sci., Nat. Sci.

* Statistically significant differences identified by an inequality sign (>) are based on two-tail t-tests at $P < .05$. Academic areas written in parentheses are placed in sequence but are not statistically significantly different from those areas following the inequality sign. They are significantly different from those areas following two inequality signs. Thus, in A, (B) > C > D, B does not differ from C but does differ from D.

Table 7

Average Ranks of Courses in Six Academic Areas

Factors	Education	LA	Business	Soc.Sci.	Humanities	Nat.Sci./ Math
Form A						
Social Learning	6.0	6.5	7.5	16.0	11.60	17.5
Approp. Tchg. Method	10.25	15.5	5.5	7.5	8.40	9.5
Content Relevancy (Neg.) *	11.25	11.25	4.0	13.0	8.40	8.0
Analytic Thinking	7.75	12.0	11.5	6.0	14.0	3.0
Academic Skill Development	14.5	10.75	12.5	8.5	4.20	13.0
New Ideas-Liberal Lrng.	13.5	9.0	12.5	3.5	7.0	16.5
Form B						
Fact/Concept Learning	7.75	16.0	7.0	8.0	10.25	7.0
Social Learning	7.25	7.25	9.0	18.0	9.0	16.5
Enthusiasm for Learning	13.75	10.75	12.5	3.5	9.4	11.0
Synthetic Thinking	10.75	5.25	11.5	6.5	13.6	11.0
Approp. Tchg. Method * (Neg.)	7.5	10.25	12.5	9.0	10.8	11.0
Problem Solving	6.75	7.75	7.5	14.5	15.8	3.5
Academic Skill Development	13.5	9.25	10.0	12.0	4.6	16.0

* Rank of 19 represents highest content relevancy, rank of 1 represents least content relevancy. Rank of 19 represents most appropriate teaching method, rank of 1 represents least appropriate method.

Twelve of the thirteen ANOVAs were statistically significant at $P \leq .022$. All of the ANOVAs on factors reflecting traditional academic competencies were significant. Inspection of the comparisons presented in Table 6 confirms our expectations regarding the relative emphasis of academic areas on the traditional academic competencies. Outcomes related to social learning are emphasized in education and LA and less emphasized in the natural sciences. The low social learning score of the two social science classes in this study may reflect a sampling problem. One course is in history, the other is a psychology course taught by the lecture method. Neither course attempts to facilitate social learning skills. Outcomes related to analytic thinking and problem solving are emphasized in natural science and less so in humanities. Outcomes related to academic skill development are emphasized in humanities, and less so in the natural sciences. Additional comparisons are presented for the reader's inspection. Inspection of the data in Appendix B will identify for the reader where large variations across courses within an academic area exist. The standardized factor score means for liberal learning for the two courses in business, for example, are + .426 and - .898, a very wide range, whereas the same means for the four courses in humanities are all between + .527 and + .984, a more consistent pattern.

Data are presented in Appendix C which describe the intercorrelations among factor scores based on the nineteen course factor score means. Although the factors themselves do not correlate meaningfully when considered across all students, they may be correlated across courses if courses which emphasize outcomes in some factor areas also emphasize or deemphasize outcomes in other areas. Inspection of the tables of course mean intercorrelations presented in Appendix C (among Form A and among Form B factors and across Forms A and B factors) shows that this does happen. Courses which emphasize outcomes

concerned with analytic thinking also emphasize problem solving ($r = .57$, $P < .01$), and synthetic thinking ($r = .50$, $P < .02$), and deemphasize social learning ($r = .-4223$, $P < .05$). Courses which emphasize outcomes concerned with receptivity to new ideas/liberal learning also emphasize synthetic thinking ($r = .40$, $P < .05$), generate enthusiasm for learning ($r = .40$, $P < .05$), are seen as content relevant ($r = -.41$, $P < .05$), and deemphasize problem solving ($r = -.72$, $P < .01$). Courses which emphasize outcomes concerned with fact and concept learning or academic skill development generate high ratings of these types of outcomes if the teaching method is seen as appropriate by the learner ($r_{fc} = .69$, $P < .01$; $r_{asd-a} = .50$, $P < .05$).

The same set of intercorrelations document the consistency of outcome ratings for the Forms A and B factor scales of social learning ($r = .76$, $P < .01$) and academic skill development ($r = .73$, $P < .01$) but not for the appropriate teaching method factor scale ($r = -.3135$, $P = .096$).

A correlation of $r \cong .39$ is needed for statistical significance at $P < .05$. Thirteen correlations of the 78 presented meet this criterion, an additional thirteen have $r \geq .30$, suggesting that additional patterns may emerge in a larger sample of classes. Note that these correlations describe relationships among a limited set of courses and may differ elsewhere. There is no necessity, for example, that courses emphasizing analytic thinking cannot also emphasize social learning, perhaps by using brainstorming techniques for solving problems using analytic methods.

IV. Scale Improvement, Stage IV

A. Item Selection

In Stage IV, the SLS was shortened, refined, and further validated. A single fifty item form of the SLS was developed by using 46 items from Forms A and B of the Stage III version of the SLS and four new items (Appendix D). Items were chosen from Forms A and B if they loaded high on a single factor and not on other factors. New items were written to balance factor representation.

Response alternatives were anchored to a more specific scale by specifying the percentage of time the statement applied (See Scale Instructions in Appendix D). Items were arranged in a single random order.

B. Structural Analysis

The fifty item Stage IV version of the SLS was administered in November, 1978, and responses received from two samples - 653 students enrolled in 25 courses at a large urban midwestern state university and 218 students enrolled in 19 courses at a small rural state college in the midwest. Representation across disciplines was fairly well balanced in both samples. In addition, the Stage IV SLS was administered to introductory psychology students at the university above for use in an exploratory study relating achievement to SLS ratings.

The university sample was randomly divided within courses into two groups to allow for cross-validation of the factor structure. Stage III results had shown no advantage to oblique factor solutions so all further structural analyses considered only orthogonal solutions. Factor analyses using squared multiple correlations as the diagonal elements, principle components extraction, and the Varimax criterion for rotation were performed for each half of the university sample. The Scree test showed that a maximum of nine factors should be extracted in each case. For sample A, a six factor structure was most meaningful. Solutions with 7, 8, or 9 factors had weak factors with few items loading. The same type of six factor solution was performed on sample B, the cross-validation or confirmation sample. Inspection of the sample A and B solutions showed that the six factors overlapped considerably. A more precise test of the symmetry of the factor solutions was performed by intercorrelating the item factor loadings for each factor in the two solutions. If similar factors are arranged in the same order and the solutions are relatively isomorphic, then the diagonal elements of the intercorrelation table will be very high and the off-diagonals will be low. In this case, the median diagonal correlation was

.92, all diagonal $r_s \geq .81$. The median off-diagonal correlation was .06 and all were statistically significantly lower and different from the diagonal r both across rows and columns (all $p_s < .01$). Table 8 presents the intercorrelation table.

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Insert Table 8 here

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Two additional cross-validations of the six factor structure come from inspection of the best structural solutions for the state college sample and for the large introductory psychology course. In each case, the same six factor orthogonal solution was found as above. Item loading intercorrelations across factors found for the state college sample and for the split-half university samples show results similar to those presented in Table 8.

The relationship of this six factor solution to the nine factor solution found in Stage III is clear. The liberal learning and synthetic thinking factors combined to form a factor emphasizing intellectual values and liberal learning; enthusiasm for learning and content relevancy combined to form a student motivation and relevancy factor; analytic thinking and problem solving factors combined; other factors are the same with writing skills representing the earlier academic skills development factor and the social learning and appropriateness of teaching method factors the same as in Stage III. The factual learning factor, weak in Stage III, broke up in Stage IV. Items from this factor loaded weakly ($\sim .3$) on several factors, indicating, for example, that "learning terms and definitions" related to ratings of appropriateness of teaching method, social learning, and motivation and relevancy, and that "thinking clearly and logically" related to ratings of appropriateness of teaching method, liberal learning, and motivation and relevancy.

Table 9 presents the items, factor loadings, and percent of common variance accounted for by each of the six factors in the structural analysis for the combined university samples. Forty-nine of the 50 items loaded $|.3|$ or greater on at least one factor. Four items loaded on three or more factors and were

Table 8

Intercorrelations of Item Factor Loadings*

Sample A Factors	Sample B Factors					
	F1	F2	F3	F6	F4	F5
F1	.967	.378	.169	.396	-.324	-.142
F2	.294	.918	.006	.371	.069	.389
F3	.306	.072	.932	.433	-.156	-.171
F4	.694	.502	.373	.893	.015	.135
F5	-.333	-.143	-.119	.050	.923	.205
F6	-.237	-.030	-.245	-.084	.143	.807

* N = 50 items

dropped from further consideration. Seven items which loaded similarly on two factors were assigned to the factor which seemed to be most conceptually appropriate. An item was included in the factor scales if it loaded $>|.3|$ and if its item-total correlation was $>|.3|$. Only one item was dropped because of a low item-total correlation ($r = .25$). Coefficient alphas were calculated for each factor scale using unit weights for items and reverse scoring for items with negative factor loadings. The αs are presented in Table 9.

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Insert Table 9 here

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C. Validity Studies

In the studies below, unit weight factor scales (as presented in Table 9) rather than true factor scores were used as the basis for validation in order to anticipate Stage V refinement of the SLS. The factor scales represent a more practical approach to measurement as compared to the calculation of true factor scores. They are more useable by persons without access to computers and less subject to variation in changes of factor loadings over applications. In addition, student scale scores were divided by the number of items in each scale to facilitate comparisons across scales and ease of interpretation relative to the item ratings.

Three types of validity studies were performed. The first two are related to instructor ratings of importance of outcomes in the domains measured by the SLS and follow the same logic as the validity tests performed in Stage III. Faculty rated the importance or relevance of student outcomes in the nine areas measured by the Stage III version of the SLS on a four point scale from "very important" to "irrelevant or not important." These ratings were used to construct an orthogonal contrast between factor scales rated in the higher two categories of importance versus those rated in the lower two categories of importance for each course. Where necessary, ratings of the Stage III scales were combined to represent approximate ratings for the Stage IV scales. For example, ratings

Table 9

The Student Learning Scales

I. Appropriateness of Instructional Method for the Student.

α = .89

Item	Factor Loading	Item-total Correlation*
I found the instructor's presentations clear and at a level appropriate for me.	.78	.75
I felt that the teaching method in this course was appropriate for me as a learner.	.75	.71
I thought that the relationships between the course objectives, content covered, and evaluation procedures were logical and consistent.	.71	.73
I understood the objectives of this course.	.70	.70
In this class, I felt sure that I was learning the important things in this field.	.68	.74
I was able to study effectively for this course.	.67	.67
I was able to follow instructions accurately for class assignments and exams.	.63	.56
I was rarely bored in this course.	.54	.56
I was unsure of what I was supposed to accomplish in this course.	-.54	.52
I did not understand the text books.	-.34	.36

II. Liberal Learning

α = .88

Item	Factor Loading	Item-total Correlation*
In this class I learned things which challenged my values and made me think about my point of view carefully.	.63	.61
I find myself more receptive to new ideas as a result of this class.	.59	.59
I am more willing to question traditional ideas and standards as a result of this class.	.58	.56
In this class, I was able to generate hypotheses (ideas, explanations) to explain new phenomena.	.55	.61
I have increased understanding of the importance of this field for solving human problems.	.55	.59
My intellectual curiosity was stimulated in this course.	.51	.64
In this class, I was able to make generalizations based on the facts that I learned.	.46	.57
When controversial issues were presented, I understood the opposing viewpoints and their implications.	.45	.48
I am able to integrate the facts I learned in this class into a larger perspective of the field.	.43	.59
I am able to propose ways of testing new ideas or hypotheses as a result of this class.	.43	.53

I was able to evaluate major theories or new ideas using well-thought-out criteria.	.37	.53
In this class, I've become more skilled at backing up my arguments with data and/or documentation.	.34	.51

III. Social Learning

α = .83

Item	Factor Loading	Item-total Correlation*
Working with other students in this class has been an important part of my learning experience.	.80	.67
I was able to work effectively with other people in this course.	.77	.64
I have enjoyed learning from the other students in this class.	.76	.69
In this class I have come to value open communication between people.	.60	.63
In this class I've come to understand how different people approach learning situations.	.41	.51
I have developed a greater awareness of other people's values in this class.	.35	.45

IV. Analytic Thinking and Problem Solving

α = .77

Item	Factor Loading	Item-total Correlation*
I am able to use graphs, charts, and other kinds of tables to interpret events and relationships in this field.	.61	.43
I could figure out the steps necessary to solve most of the problems in this course.	.60	.50
I can analyze theories in this field based on their logical consistency and support from data.	.53	.55
I've become more skillful in recognizing when problem-solving strategies I know apply to new situations.	.52	.50
I can state the general principles, rules, or formulas presented in this course.	.51	.55
In this course I have come to recognize the importance of the scientific method as a procedure for learning about the world.	.48	.42
I am able to give examples or illustrations of most of the concepts introduced in this course.	.42	.46

V. Motivation and Relevancy

$\alpha = .77$

Item	Factor Loading	Item-total Correlation*
What I learned in this course was trivial and unimportant.	-.52	.57
I've learned practical things in this course which will apply to my work or profession.	.51	.51
I do not plan to take more courses in this field.	-.50	.41
I was not motivated to work in this class.	-.45	.49
I was eager to learn more about the subject.	.44	.59
I understand how this subject matter applies to the real world.	.36	.48

VI. Writing Skills

$\alpha = .69$

Item	Factor Loading	Item-total Correlation*
In this class, I was able to write essays (exams, papers, reports) which expressed my thoughts clearly and precisely.	.68	.55
I have further developed my writing skills in this class.	.66	.56
I was able to use the library effectively to help me with my class project or term report.	.43	.43

* Items with negative factor loadings were reverse scored for calculation of αs and corrected item-total correlations.

of "enthusiasm for learning" and "content relevance" were averaged to represent the faculty rating of importance for the "motivation and relevancy" factor scale. Nineteen instructors in the university sample supplied such ratings and 14 of the 19 contrasts possible were statistically significant ($p_s < .01$) in the appropriate direction. In three of the four nonsignificant contrasts, the N was less than eight. In an additional two contrasts comparing scales rated very or moderately important, the contrasts were significant ($p < .05$). Table 10 presents the course means, F_s for the orthogonal contrasts, and mean scale ranges.

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Insert Table 10 here

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The contrasts provide an indirect test of validity of student ratings on the factor scales only if three assumptions are met: (1) instructors can identify desirable course goals or outcomes; (2) instruction is directed to these goals; and (3) student ratings are accurate self-descriptions. If these assumptions are not met in any course, then the contrast performed should not be statistically significant. Since 16 of the 21 within-course contrasts were statistically significant, it is reasonable to accept the SLS as discriminating appropriately between different types of student outcomes within a single course.

A second indirect test of validity is made possible by relating instructor ratings of importance to the mean student outcome ratings across classes for each factor scale. If one compares correlations of instructor and mean class ratings on the same and across different factor scales, ratings on the same scales should be more highly correlated than those across scales if the student ratings are valid. This strategy for evaluating the validity of student ratings was developed by Hoyt and Cashin (1977) for the IDEA System and is subject to the assumptions used in the within-class tests above. The intercorrelation matrix is presented in Table 11 and is based on 21 pairs of ratings in each cell. The median diagonal correlation is -.45, the median off-diagonal correlation is -.09, indicating that the intercorrelation matrix conforms to the expected

Table 10

Course Scale Means, Fs for Orthogonal Contrasts and Mean Scale Ranges

Course Code	N	Approp. Tchg. Method	Lib. Lrng.	Soc. Lrng.	Anal. Tkg.	Mot. and Rel.	Writing	F	p
		Scales							
1111	52	4.17	2.97	2.13	2.46	3.68	2.52	177.23	.001
1112	16	3.23	3.39	3.21	2.59	3.49	2.04	8.61	.01
1114	28	3.11	3.18	2.51	2.63	3.09	2.10	< 1	n.s.
1113	26	4.07	2.70	1.92	3.24	3.10	1.12	56.26	.001
1123	7	3.03	3.65	3.00	3.02	3.17	3.33	1.26	n.s.
1221	19	3.00	3.09	2.34	2.77	3.16	2.26	51.06	.001
1211	17	3.84	3.60	4.54	2.92	4.19	2.63	106.33	.001
1223	29	3.76	3.10	2.18	3.12	3.76	1.20	579.67	.001
1224	34	4.22	3.38	2.87	3.05	4.23	1.43	371.33	.001
1222	26	4.21	3.26	2.81	3.04	4.14	1.67	221.37	.001
1311	64	4.01	3.19	2.55	3.24	3.75	1.49	545.78	.001
1322	4	4.15	3.92	3.58	4.32	4.58	2.08	< 1	n.s.
1314	8	3.56	2.93	3.19	3.41	4.13	2.04	< 1	n.s.
1422	8	3.99	2.99	3.33	3.46	4.23	2.08	34.65	.001
1513	32	3.15	2.69	2.97	3.25	3.53	2.25	44.38	.001
1512	34	3.19	2.47	2.64	3.29	3.54	1.41	154.43	.001
1521	24	3.58	2.75	2.17	3.50	4.24	1.29	65.16	.001
1511	63	3.07	2.81	3.12	2.82	3.48	1.75	17.67	.001
1611	68	3.19	2.94	3.56	3.01	3.16	2.50	37.87	.001*
	No scale rated of minor or no importance. Contrasts between very and moderately important scales performed for the following courses:								
1523	9	3.82	3.89	3.61	3.46	4.26	3.33	5.44	.05
1522	35	2.72	2.92	2.80	2.96	3.45	3.30	5.07	.05

Range of Scale Means

Course Code	Approp. Tchg. Method	Lib. Lrng.	Soc. Lrng.	Anal. Tkg.	Mot. and Rel.	Writing
Minimum	2.72	2.47	1.92	2.46	3.09	1.12
Maximum	4.22	3.92	4.54	4.32	4.58	3.33

Scale Means for All Students

3.55	3.04	2.77	3.05	3.61	1.98

* Contrast significant but in the opposite direction

pattern. The matrix also shows that faculty who rated using teaching methods appropriate for the student as important had students who felt motivated to learn ($r = -.66$).

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Insert Table 11 here

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The third type of validity test compares criterion group factor scale scores on the SLS (See Stage III, page 9, for a more complete explanation of the logic of this test). Courses in the natural sciences, humanities, social sciences, business, and learning analysis were the criterion groups expected to score differently on the factor scales. Repeated measures ANOVA, classes nested within disciplines and repeated over factor scales, were performed for all subjects and classes. All effects were significant ($ps < .000$). A more complete analysis of the university data only was performed. The nested ANOVA was not possible here because an unequal number of courses was nested within disciplines. Accordingly, the more conservative Discipline (5) X Factor Scale (6) ANOVA with repeated measures on the second factor was performed (See Stage III, page 10, for an explanation of the appropriateness of this analysis). Table 12 presents the ANOVA summary table and means for the main effects. Table 13 presents the means for the interaction and the results of one-way ANOVAs across disciplines on a single factor. Table 14 presents in prose form the results of the simple effects tests of the Disciplines X Factor Scales interaction. Note that the simple effects comparisons are based on raw score means rather than standardized means as they were in the Stage III validity tests. As a consequence, the factor scale "Appropriateness of Teaching Method for the Student", for example, is rated high by many disciplines and would change rank order on the second half of Table 14 if standardized. The comparisons represent actual differences in the kinds of learning outcomes students report experiencing rather than relative

Table 11

Intercorrelations Between Faculty Ratings of Scale Importance and Mean Student Outcome Ratings Across Twenty-one Classes

Faculty Ratings*	Mean Student Ratings* Scale					
	Approp. Tchg. Method	Lib. Lrng.	Soc. Lrng.	Anal. Tkg.	Mot. and Rel.	Writing
Appropriate Tchg. Method	-.31	.09	-.25	-.34	-.66	.03
Liberal Learning	.03	-.49	-.04	.13	.11	-.41
Social Learning	-.28	-.12	-.51	-.12	-.25	-.25
Analytic Thinking	.47	.18	.28	-.30	.27	.06
Motivation & Relevancy	-.12	-.01	-.35	-.28	-.62	-.06
Writing	.09	-.22	.02	.10	-.16	-.40

*Student Ratings: 1 = Rarely True, 5 = Almost Always True
Faculty Ratings: 1 = Very Important, 4 = Unimportant

Negative correlation indicates concordance. $r = .36$ is statistically significant at $p < .05$.

outcomes across disciplines or factor scales.

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Insert Tables 12, 13, and 14 here

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The results show, for example, that the students as a group, agree that the teaching methods used are appropriate for them as learners, that they are motivated to learn and that they have relatively infrequent experiences with social learning and even less with writing skills development. Comparisons across factor scales within disciplines show that analytic thinking and problem solving are relatively greater parts of the student learning experience for students in the natural sciences and business than for other students, that social learning is a relatively greater experience for students in the experimental LA course, and that liberal learning is a relatively lesser experience for business students compared to other students. Comparisons across disciplines on the same factor scale confirm these results and also show that liberal learning is rated higher by students in natural sciences than by those in humanities, a result which reflects a truly scientific perspective but which was not expected.

An exploratory study of the relationship of achievement to the SLS ratings was performed in a large university introductory psychology course. Student volunteers (513 of approximately 800 students) received extra credit points for completing the SLS and identifying themselves by their student number which permitted retrieval of achievement test data. The achievement test scores were the sum of points earned on three psychometrically equivalent multiple choice exams. Course grades were based on the class distribution of this sum. Arguments for and against a relationship between course achievement and SLS ratings can be made. Sufficient concordance across tasks graded in courses and SLS factor scales is evident on some scales (e.g. analytic thinking and problem solving) such that students who report greater amounts of learning outcomes on a factor scale might be expected to achieve more in related fields than students who report

Table 12

ANOVA Summary Table

Source	df	MS	F	p	ω^{2*}
Disciplines	4	7.82	3.79	.005	.017
error	640	2.07			
Factors	5	194.71	428.38	.000	.3593
D x F	20	13.74	30.22	.000	.0983
error	3200	.45			

*Omega-square calculated separately for within and between variances.

Main Effects Means

Factors:	Appropriate Teaching Method	3.55
	Liberal Learning	3.04
	Social Learning	2.77
	Anal. Tkg. and Problem Solving	3.05
	Motivation and Relevancy	3.62
	Writing	1.98
Disciplines:	Humanities	2.90
	Social Science	3.11
	Natural Science	3.11
	Business	2.93
	Learning Analysis	3.06

Table 13

Factor Scale Means for Five Disciplines

Factor	Discipline					F	p
	Hum.	Soc. Sci.	Nat. Sci.	Bus.	LA		
Approp. Tchg.	3.67	3.87	4.01	3.14	3.19	29.89	.000
Lib. Lrng.	2.99	3.28	3.32	2.79	2.94	12.14	.000
Soc. Lrng.	2.48	2.84	2.44	2.86	3.56	19.84	.000
Anal. Tkg.	2.72	3.00	3.47	3.11	3.01	15.59	.000
Mot. and Rel.	3.40	3.93	3.83	3.61	3.16	14.13	.000
Writing	2.17	1.71	1.57	2.06	2.50	14.06	.000
N	143	125	112	197	68	$\Sigma_{N=645}$	

Table 14*

Significant Differences between Factor Scales for Five Disciplines

Humanities:	Approp. Teaching Method	> Motivation and Relevancy	> Liberal Learning	> Analytic Thinking	) Social Learning	> Writing
Social Science:	Motivation and Relevancy	) Approp. Teaching Method	> Liberal Learning	> Analytic Thinking	) Social Learning	> Writing
Natural Science:	Approp. Teaching Method	) Motivation and Relevancy	> Analytic Thinking	) Liberal Learning	> Social Learning	> Writing
Business:	Motivation and Relevancy	> Approp. Teaching Method	) Analytic Thinking	> Social Learning	) Liberal Learning	> Writing
Learning Analysis:	Social Learning	> Approp. Teaching Method	) Motivation and Relevancy	) Analytic Thinking	) Liberal Learning	> Writing

*Statistically significant differences are identified by an inequality sign. Factor scales written in parentheses are placed in sequence, but are not significantly different from those scales following one inequality sign, but are different from those following two inequality signs. Thus, in A, (B) > C > D, B does not differ from C but does differ from D.

Significant Differences between Disciplines on the Factor Scales

Factor Scale	
Approp. Teaching Method	Natural Sci., Social Sci. > Humanities > LA, Business
Liberal Learning	Natural Sci., Social Sci. > Humanities, (LA) > Business
Social Learning	LA > Business, Social Sci. > Humanities, Natural Sci.
Analytic Thinking and Problem Solving	Natural Sci. > Business, LA, Social Sci. > Humanities
Motivation and Relevancy	Social Sci., Natural Sci. > Business > Humanities, LA
Writing	LA > Humanities, Business > Social Sci., Natural Sci.

such outcomes less frequently. On the other hand, within a given class, students who report greater or lesser amounts of a given type of learning experience as measured by the SLS may not differ in a related kind of achievement for one of the following reasons: (a) all students may report similar levels of learning experiences (e.g. high levels of problem solving experiences in a math class), (b) achievement may be affected by motivation, teaching method, or cognitive style match/mismatch or other factors not measured by the SLS. It is unclear then exactly what relationship student reports of learning experiences ought have to measures of classroom achievement. A similar problem exists in relating achievement to instructional evaluation. Although the literature shows, for example, that achievement is generally not related to traditional student evaluation of instruction, many faculty believe that grades do influence such ratings and some believe that the two ought to be related since "good" teaching should improve achievement. Such beliefs are relatively naive however, and do not give sufficient credence to the validity of student ratings or to the complexity of variables which influence performance.

In the psychology class, the six factor structure was replicated. Correlations of factor scale scores and achievement show low but significant ($N = 513$, $ps < .001$) relationships with five of the six SLS factor scale scores. Social learning was not related to achievement in introductory psychology. Writing was negatively correlated with achievement and the other scales were positively correlated with achievement but none correlate greater than $r = .32$. Table 15 presents the correlations and factor scale means. Interestingly, this large course which is taught by television lecture with a one-hour per week discussion section is rated relatively high in liberal learning which illustrates how the SLS can provide insight into the student learning experience. Such large introductory survey courses are ofter considered "vocabulary" courses requiring primarily associative or rote learning. The student ratings, however, suggest that the concepts acquired provide a liberalizing experience, new ways

in which to view the world, and that this course at least may play an important role in the liberal arts curriculum.

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Insert Table 15 here

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In summary, the SLS measure student outcomes in six domains with high reliability and consistency of factor structure and with sufficient validity for use in comparing results across factor scales within a single class as well as between disciplines.

Stage V

The 44 items from the six factor scales used in the Stage IV validity studies and one item reflecting factual learning were randomly arranged to form the Stage V SLS. Three items reflecting student characteristics (class level, grade expected in the course, and whether course was required by major, optional within major, or elective) and two evaluation items (course and instructor) were also included (See Appendix E). The Stage V SLS are currently being used by vote of the faculty to evaluate all courses at a private liberal arts college in the midwest. Norms will be developed and studies relating student self-ratings on the SLS and such characteristics as student grades, course level, and class size will be conducted.

Table 15

Factor Scale Means and
Correlations of SLS Factor Scales with Achievement
in Introductory Psychology (N = 513)

Scale	Mean*	r	p
Approp. Teaching Method	3.43	.32	.000
Liberal Learning	3.21	.14	.001
Social Learning	2.98	.01	N.S.
Analytic Thinking	3.08	.23	.000
Motivation and Relevancy	3.67	.22	.000
Writing	1.45	-.27	.000

* Means are significantly different, $F(5,2525) = 885.89$, $p < .000$.

Notes

1. The authors are indebted to Dr. Anthony F. Grasha for his help in conceptualizing and encouragement in implementing initial study of the SLS.

2. LA is a freshman level course intended to help students become more analytical observors of their own learning reactions in a variety of instructional contexts. It includes an introductory unit on cognitive style and four instructional units which vary in disciplinary content and teaching method. LA will be taught at six midwestern colleges and universities in the fall, 1978. For more information, please write to the FIPSE Project Director, Dr. E. Trani, Assistant Vice President for Academic Affairs, University of Nebraska, 3835 Holdrege, Lincoln, NE 68583.

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Appendix A

Forms A and B, SLS, Stage III

Student Learning Scales

Instructions: Indicate the extent to which each of the following statements describes your learning experience in this course. If a statement does not apply to your course, mark a "0" on the answer sheet beside the number of that statement. If a statement was hardly ever true of you and you strongly disagree that it describes your experience, mark a "1" on the answer sheet. If it was only occasionally true of you and you disagree that it describes your experience, mark a "2" on the answer sheet. If it was sometimes true of you, mark a "3". If it was frequently true of you and you agree that it describes your experience, mark a "4". If it was almost always true of you and you strongly agree that it describes your learning experience, mark a "5" on the answer sheet.

Not Applicable	Hardly Ever True	Only Occasionally True	Sometimes True	Frequently True	Almost Always True
0	1	2	3	4	5
Not Applicable	Strongly Disagree	Disagree		Agree	Strongly Agree

Remember that there are no right or wrong learning experiences. Each student and each course is unique and what you learn and how you learn may vary in different courses. Be sure to mark what is true of you in this course.

Student Learning Scales

1. I was able to follow instructions accurately for class assignments and exams.
2. I am thinking about taking courses in disciplines where I have never taken courses before.
3. In this course, I discovered for myself new ideas or principles.
4. I made no effort to get to know other students in this class.
5. Understanding my strengths and weaknesses in different learning situations made me feel good about myself.
6. In this course I have come to recognize the importance of the scientific method as a procedure for learning about the world.
7. I was not an active participant in this course.
8. I feel more confident majoring in this field as a result of my experience in this course.
9. I was not very attentive in this class.
10. I've come to appreciate how different people learn in this class.
11. I was able to follow the presentations in class and could describe the main points in my own words.
12. I've become more analytical about the teaching methods my instructors use.
13. I was able to function as an independent learner in this class.
14. What I learned in this course has opened my eyes to many new relationships and ideas I hadn't considered before.
15. I've learned to read text and reference material very carefully in this class.
16. I was able to summarize the material I learned in this course in written essays, reports, etc.
17. After taking this class, I am more likely to withhold my initial judgments about my instructor's teaching methods until I understand their reasons for using them.
18. In this course, I learned to adapt my learning strengths and weaknesses to new situations.
19. I wasn't able to use things I already knew to help me learn new material.
20. In this course I frequently asked myself questions about the content and was able to find answers to them.
21. I developed skills in this course which I can apply to other courses (examples: writing a bibliography, organizing information, setting up an experiment).

22. I've become more comfortable working with members in this class.

23. I have developed a greater awareness of other people's values in this class.

24. I could recall principles, generalizations, classifications, and theories that have been presented in this course.

25. I do not understand how this course relates to others in the same department.

26. In this class, I've become a better critic of my own and other's artistic performances.

27. I was able to learn at my own pace in this course.

28. Course assignments and tests increased in difficulty in this course at a pace which I could handle.

29. I found the instructor's presentations clear and at a level appropriate for me.

30. I don't understand how this subject matter applies to the real world.

31. I was able to study effectively for this course.

32. I enjoyed being evaluated on the basis of what I could do rather than what I remembered.

33. I felt that the teaching method in this course was appropriate for me as a learner.

34. I could not recognize the difference between major and minor topics in this course.

35. In this class I've learned how to support my point of view or hypothesis and data with documentation.

36. I was eager to learn more about the subject in the course.

37. I was not motivated to participate in class.

38. It was helpful to me in this class to be given frequent feedback about my performance.

39. I have further developed my writing skills in this class.

40. I have tried to persuade other students to take this course.

41. In this class I have come to value open communication between people.

42. I was encouraged to do well by the instructor and/or assistants in this course.

43. When controversial issues were presented, I understood the opposing viewpoints and their implications.

44. I didn't understand how my performance would be evaluated in this course.

45. I have become a more competent learner in this course.

46. My achievements in this course satisfy me.

47. I felt treated as an equal by the other members of this class.

48. I was afraid to ask questions about material I didn't understand.

49. I thought that the relationships between the course objectives, content covered, and evaluation procedures were logical and consistent.

50. I have a better understanding of professionalism in the field after taking this course.

51. I liked the course objectives.

52. In this class, I've further developed my skill in reading and analyzing written material.

53. Working on topics and projects of my own choosing stimulated my interest in this field.

54. What I learned in this course was trivial and unimportant.

55. Being responsible for scheduling my own exams (tests) in this class helped me to become a more independent learner.

56. I was unable to express my point of view freely in this class.

57. I was able to effectively plan my time to accomplish all that I had to do in this class.

58. I did not understand the objectives of this course.

59. When a course is taught in a way I don't like, I could think of ways to modify my learning strategy to meet the situation.

60. I felt anxious about the exams and assignments in this course.

61. I am able to use graphs, charts, and other kinds of tables to interpret events and relationships in this field.

62. My own sense of ethical behavior and responsibility was strengthened in this class.

63. In this class I did not feel free to challenge other points of view.

64. I felt free to consult with my instructor outside of class time.

65. I was able to use course material and experiences to improve my problem solving and decision making skills.

66. Working with other students in this class has been an important part of my learning experience.

67. I did not develop skills in using library resources in this course.

68. I could figure out the steps necessary to solve most of the problems in this course.

69. I did not gain a solid mastery of the factual content of the subject in this course.

70. Complex systems made more sense to me after participating in activities applying them.

71. In this class I became more skilled in evaluating courses based on how useful they are to me now and how they may help me with future work.

72. In this class I learned things which challenged my values and made me think about my point of view carefully.

73. I was able to integrate the material from this class in a meaningful way.

74. In this course, I have developed very positive expectations about my future learning experiences in college.

75. The non-competitive grading system in this course motivated me to do well.

76. My knowledge of the historical context from which this field developed has not changed.

77. I thought that the instructor's presentations and comments were boring and dull.

78. After taking this course, I more fully appreciate subject areas which are new to me.

79. My sense of responsibility to others was strengthened in this course.

80. I could place facts learned in this class into a broader picture.

81. I felt confident that each class would be organized and well managed.

82. I made great gains in conceptual understanding in this course.

83. I felt good about myself as a learner in this class because my individuality was recognized.

84. I was able to identify the resources I would need before beginning a term project.

85. I can analyze theories in this field based on their logical consistency and support from data.

86. I felt continually challenged to do my best in this class.

87. I haven't learned practical things in this course which (will) apply directly to my work.

88. I developed successful strategies for studying for and taking the tests in this course.

89. I do not plan to take more courses in this field.

90. I was able to take the initiative in designing learning experiences in this course.

91. I am able to propose ways of testing ideas or hypothesis in this field

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92. Which of the following colleges or universities are you attending?

(1) Chadron State College
(2) Doane College
(3) Kearney State College
(4) College of Saint Mary
(5) University of Nebraska-Lincoln
(6) University of Nebraska at Omaha

93. This course is in which of the following areas:

(1) Business
(2) Education
(3) Humanities
(4) Learning Analysis
(5) Natural Science Mathematics
(6) Nursing
(7) Social Science

94. There are two forms of the Student Learning Scales marked "A" or "B" on the top right hand corner of each page of items. If you have form "A", mark "1" on your answer sheet. If you have form "B", mark "2" on your answer sheet.

(1) Form A (2) Form B

Student Learning Scales

1. I did not feel free to approach the instructor when I had questions or ideas to discuss.
2. I was able to identify resources to help me prepare for exams and/or class projects in this course.
3. I have developed a sense of community with other students in this class.
4. I felt that my opinions were respected in this class.
5. I was aware in this course that I react differently to different instructors.
6. I am able to give examples or illustrations of most of the concepts introduced in this course.
7. I felt challenged by the opportunity to grow as a person offered in this course.
8. I did not feel encouraged to set my own goals in this course.
9. I was very interested in the information presented in this class.
10. I did not recognize when my work met the requirements of the tasks in this class.
11. In this course I explored the perspectives of persons whose views are very different from my own.
12. I did not have to rely on others' help to complete assignments in this class.
13. I was uncomfortable with the level of the instruction in this course.
14. In this course, I was able to recognize the varied ways by which other people learn.
15. I felt free to discuss topics with the other students in this class.
16. I felt that I made significant gains in thinking clearly and logically in this course.
17. I learned little from the class activities and exercises.
18. After hearing a lecture or discussion in this class, I was able to summarize the main points.
19. I felt uncomfortable with the rate material was presented in this class.
20. I have discussed my learning experiences in this class with other people.
21. I have increased my knowledge of terms and definitions in this course.
22. I was unsure of what I was supposed to accomplish in this course.
23. I was stimulated in this course to think about the material in many different ways.

24. I put an appropriate amount of time and effort into this class.

25. I found it easy to learn in this class because I could relate the material to my personal experience.

26. I would like to develop some of the skills and abilities of my instructor in this course.

27. My interest in the subject led me to do a lot of outside reading or other extra work to learn more about it.

28. My intellectual curiosity was stimulated very little in this course.

29. In this course, I began to recognize how my learning style interacts with my instructor's teaching style to affect the way I learn.

30. In this class, I enjoyed reading a greater variety of materials than I usually do.

31. I was able to relate the class presentations to aspects of the subject matter I had learned elsewhere.

32. I found that I learned a lot in this class because I could repeat tests (exams) without penalty.

33. I can state the general principles and rules presented in this course.

34. The importance of college for my own development became more clear to me in this course.

35. I planned my study time appropriately for this course.

36. When complex problems were presented in this course, I attempted to solve them by reviewing knowledge which was related to the problem.

37. The things I learned in this class will be important to me throughout my life.

38. I was not motivated to work in this class.

39. I have further developed my sense of self-reliance in this course.

40. I have an increased understanding of the importance of this field for solving human problems.

41. I had difficulty summarizing the main points of the assigned reading materials.

42. The things I've learned in this course are not related to my career aspirations.

43. In this class I increased my skill in using mathematical procedures to solve problems.

44. I enjoyed being able to learn at my own rate in this class.

45. The instructor's enthusiasm for the subject made me want to learn more about it.

46. I felt that the instructor really cared about the subject in this course.

47. I feel proud of my performance in this class because the standards are very high.

48. I learned better by being exposed to several ways of receiving information (e.g. tests, films, discussion, etc.) in this class.

49. My intellectual curiosity was greatly stimulated in this course.

50. I found that I worked hard to get a good grade in this class because of the competition from other students.

51. I was able to evaluate major theories or new ideas using well thought-out criteria.

52. In this course, I was able to explore how the subject matter could be applied or utilized in other situations.

53. After taking this course, I feel more comfortable choosing courses and/or instructors for future semesters.

54. When writing a term report for this class, I had difficulty organizing the material logically.

55. I was able to develop my creative abilities in this class.

56. I did not acquire skills and/or knowledge in this course which are directly applicable to further work in my major.

57. I was rarely bored in this course.

58. I did not understand the text books.

59. I found the learning activities and assignments to be creative tasks for me.

60. In this class, I was able to write essays (papers, reports) which expressed my thoughts clearly and precisely.

61. I have enjoyed learning from the other students in this class.

62. I'm more sensitive to the needs of others as a result of this course.

63. I was able to work effectively with other people in this course.

64. In this course I did not feel challenged to do my best.

65. Writing reports did not help me to understand this subject area.

66. My experiences in this class have enhanced my sense of personal achievement.

67. I can formulate opinions in this class based on diverse sources of information.

68. I found it helpful to be periodically informed of my progress in this course.

69. I am attending or participating in more cultural activities (e.g. music, theater, art, etc.) as a result of this course.

70. It was clear to me that my grade in this class was based on my own performance and didn't depend on how well other students did.

71. I had difficulty using the library effectively to help me with my class project or term report.

72. I have developed problem solving strategies which are useful in this field.

73. I felt that the instructor cared about me as a person.

74. I found the questions the instructor asked difficult to understand.

75. I gained a broad perspective on the discipline in this course.

76. I was aware of myself as an active learner in this course.

77. I thought the content in this course was poorly organized.

78. In this class, I felt sure that I was learning the important things in this field.

79. In this course, I came to recognize the characteristics of some of the major college teaching methods.

80. In this class, I was able to generate hypotheses (ideas, explanations) to explain new phenomena.

81. In this class, I've become more skilled at backing up my arguments with data and/or documentation.

82. I was eager to learn more about the subject.

83. In this class, I was able to make generalizations based on facts that I learned.

84. In this course I developed technical skills which helped me to solve problems.

85. I can identify the personal biases my instructor has in this field.

86. I didn't contribute to the discussions in this class.

87. I was able to learn a lot in this course on my own by using the study guide and other prepared materials.

88. I was encouraged in this class to act in ways consistent with my own values.

89. I understood the relationships between the various parts or units of this course.

90. In this course I was able to seek explanations for what I observed in nature.

91. In this course I developed strategies which help me learn in courses I don't particularly like.

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(6) University of Nebraska at Omaha

93. This course is in which of the following areas:

(1) Business
(2) Education
(3) Humanities
(4) Learning Analysis
(5) Natural Science/Mathematics
(6) Nursing
(7) Social Science

94. There are two forms of the Student Learning Scales marked "A" or "B" on the top right hand corner of each page of items. If you have form "A", mark "1" on your answer sheet. If you have form "B", mark "2" on your answer sheet.

(1) Form A (2) Form B

Appendix B

Factor Score Means, Standard Deviations, Ns and Ranks for

Nineteen Courses Arranged by Academic Area

SLS Form A

Academic Area	N	Social Learning			Appropriate Teaching Method			Relevancy of Content (Neg)			Analytic Thinking			Academic Skill Development			Receptivity to New Ideas/ Liberal Learning		
		$\bar{X}$	SD	Rank	$\bar{X}$	SD	Rank	$\bar{X}$	SD	Rank	$\bar{X}$	SD	Rank	$\bar{X}$	SD	Rank	$\bar{X}$	SD	Rank
Business	32	-.092	.499	14	.188	.676	7	.084	.910	5	.310	.578	6	-.353	.741	13	.426	.758	6
Business	4	+1.31	.589	1	.593	.173	4	.188	.435	3	-.884	.363	17	-.349	.492	12	-.898	.703	19
Education	23	+.681	.753	4	.436	.5996	6	-.352	.766	14	1.121	.367	1	-.119	.661	10	-.443	.620	17
Education	11	+.034	.749	12	-1.06	.717	18	.800	1.625	1	.072	.519	12	-1.026	.716	18	-.105	.842	13
Education	7	+1.178	.454	2	-.589	.584	16	-.376	1.04	13	-.076	.571	13	-.374	.608	14	-.426	.942	16
Education	6	+.473	.303	6	.865	.375	1	-.554	.231	17	.344	.550	5	-.401	.867	16	.175	.308	8
Humanities	67	-.414	.780	16	.096	1.053	9	.331	.948	2	-.757	.865	15	.511	.769	4	-.077	.984	12
Humanities	9	+.453	.864	8	-.113	.528	13	.010	.396	6	-.799	.649	16	.636	.397	3	.702	.751	3
Humanities	8	-.178	.383	15	.109	.576	8	-.276	.681	11	.413	.481	7	.410	.415	5	.073	.527	9
Humanities	7	+.253	1.477	10	.064	.515	10	-.484	.670	16	-1.038	.739	18	-.026	.920	8	.258	.772	7
Humanities	2	+.402	.322	9	.822	.644	2	-.396	.732	15	-.605	.241	14	.942	.411	1	.648	.677	4
LA	18	+.792	.715	3	-.580	.804	15	-.057	1.064	10	.211	.693	10	.255	.836	6	.020	.641	10
LA	13	+.072	.691	11	-.903	1.204	17	-.036	.720	9	.190	.494	11	.147	.874	7	-.049	.924	11
LA	10	+.471	.903	7	-.046	.517	11	-.003	.836	8	.264	.815	8	-.215	1.125	11	-.135	.591	14
LA	2	+.666	.493	5	-2.038	.710	19	-.938	.858	18	-1.235	.230	19	-2.601	.389	19	1.452	.561	1
Nat. Sci.	6	-.979	.703	18	-.251	1.028	14	+.099	.569	4	.679	.463	4	-.042	.363	9	-.395	.822	15
Nat. Sci.	4	-.543	.692	17	.544	.561	5	-.328	.752	12	.856	.429	2	-.844	.498	17	-.686	.947	18
Soc. Sci.	7	-2.142	.843	19	.646	.743	3	-1.216	.611	19	.696	.670	3	-.375	.744	15	-.898	.703	19
Soc. Sci.	5	-.091	.244	13	-.082	.524	12	.001	1.038	7	.260	.265	9	.703	.384	2	.816	.680	2

SLS Form B

Academic Area	N	Fact/Concept Learning $\bar{X}$	SD	Rank	Social Learning $\bar{X}$	SD	Rank	Enthusiasm For Learning $\bar{X}$	SD	Rank	Synthetic Thinking $\bar{X}$	SD	Rank	Appropriate Teaching Method $\bar{X}$	SD	Rank	Individualization $\bar{X}$	SD	Rank	Academic Skil Development/ Logical Thinki X	SD	Ran
Business	31	- .115	.604	11	- .204	.516	14	- .211	.638	15	.595	.535	4	-.047	.885	8	.041	.477	10	.206	.658	8
Business	6	.555	1.147	3	.80'	.520	4	.170	.742	10	.988	.960	19	-.436	.925	17	.424	.377	5	- .189	.766	12
Education	21	.558	.517	2	.749	.472	5	.327	.551	8	.387	.647	8	.023	.653	7	.986	.411	2	- .372	.900	13
Education	9	-1.650	.780	19	.431	.466	11	- .470	.809	17	.012	.439	12	.712	.774	1	.322	.463	7	- .646	.650	16
Education	8	.417	.709	6	1.241	.517	1	.131	1.521	11	- .753	.881	18	.471	.862	4	.504	.620	3	- .589	.554	15
Education	7	.500	.488	4	.405	.319	12	-1.110	.765	19	.545	.809	5	-.522	.771	18	- .564	.682	15	- .050	.683	10
Humanities	73	.109	.952	10	- .514	.780	16	- .183	.904	14	.639	.917	17	.059	1.055	6	- .441	.855	14	.329	.656	6
Humanities	10	.301	.433	12	.739	.493	6	.435	.841	7	.222	.712	14	-.151	.653	10	- .887	.557	17	.591	.710	3
Humanities	10	.240	.797	8	.257	.704	13	- .118	.446	12	.430	.515	6	-.273	.878	14	- .042	.813	11	.759	.632	2
Humanities	7	- .529	.617	16	.955	.628	2	.701	1.040	4	- .301	1.345	16	-.107	.959	9	-1.121	.848	19	- .075	1.408	11
Humanities	2	.446	1.201	5	.535	1.580	8	1.970	.614	1	.270	1.341	15	-.308	.651	15	- .924	.216	18	1.049	.152	1
LA	21	.417	.785	14	.482	.670	9	- .181	.585	13	.408	.828	7	-.252	1.010	12	.426	.413	4	.058	.889	9
LA	8	- .445	.854	15	.687	.688	7	- .517	.966	18	.226	.481	10	.447	.842	5	.110	.652	8	.418	1.126	4
LA	6	- .669	1.318	1'	.474	.586	10	.225	.703	9	.863	.729	1	-.189	.614	11	.083	.586	9	.275	1.290	
LA	4	- .844	.888	18	.953	.308	3	.731	.626	3	.664	.348	3	-.255	.106	13	- .318	.899	12	- .906	.444	1'
Nat. Sci.	14	.804	.751	1	- .827	.609	18	.452	.740	6	- .148	.298	13	.524	.873	3	1.403	.650	1	-1.059	.554	1'
Nat. Sci.	10	.328	.795	13	- .465	.886	15	- .374	1.300	16	.373	.633	9	-.524	.648	19	.404	.694	6	- .430	.957	1
Soc. Sci.	9	.216	.421	9	- .807	1.013	17	.564	.664	5	.801	.406	2	-.395	.355	16	- .404	.303	13	-1.302	.708	1
Soc. Sci.	8	.284	.832	7	-1.280	.903	19	.913	.901	2	.132	.715	11	.563	1.182	2	- .845	.634	16	.362	.538	

Appendix C

Intercorrelations Among

Course Mean Factor Scale Scores, N = 19

Form A

	Soc. Lrng.	Ap.Tchg.Meth.	Rel.Cont.(Neg)	Anal.Tkg.	Ac.Sk.Dev.	Lib.Lrng.
Social Learning		-.2172	.2179	-.4223*	-.0708	-.1330
Approp. Tchg. Method			-.0897	.3126	.5021*	-.2825
Content Relevancy				-.0331	.2771	-.4097*
Analytic Thinking					.1059	-.3821
Acad. Skill Develop.						-.1259
Liberal Learning						

Form B

	F/C L.	Soc.Lrng.	Enthus.Lrng.	Syn.Tkg.	Ap.Tchg.Meth.	Prob.Solv.	Ac.Sk.Devel.
Fact/Concept Lrng.		-.2526	.2069	-.2770	-.1579	.1572	.0562
Social Learning			-.0302	-.2155	-.1394	-.0136	.1330
Enthusiasm for Learning				-.1838	-.0099	-.3320	.1240
Synthetic Thinking					-.2656	.2744	-.1243
Approp. Tchg. Method						.2744	-.1243
Prob. Solving							-.4725*
Acad. Skill Devel.							

* $P < .05$

	Form A					
Form B	Soc.Lrng.	Ap.Tchg.Meth.	Rel.Cont.(Neg)	Anal.Tkg.	Ac.Sk.Devel.	Lib. Lrng.
Fact/Concpt. Lrng.	-.0105	.6947*	-.3515	.2686	.3402	-.2901
Social Learning	.7562*	-.3388	-.0478	-.4546*	-.2043	-.0512
Enthus. for Lrng.	.0164	.1004	-.3589	-.3244	.1473	.4032*
Syn. Thinking	-.3798	-.0899	-.3494	.4998*	-.2552	.3971*
Approp.Tchg.Meth.	.0470	-.3135	.3858	.1565	-.0499	-.1430
Problem Solving	.0783	-.0484	.1946	.5727*	-.3221	-.7238*
Acad.Skill.Devel.	.2986	.2129	.3504	-.2414	.7343*	.1680

Appendix D

Stage IV Version of the SLS

Fact and Concept Learning	Source*	Load
I am able to give examples or illustrations of most of the concepts introduced in this course.	B	.48491
I felt that I made significant gains in thinking clearly and logically in this course.	B	.49596
I have increased my knowledge of terms and definitions in this course.	B	.57900
I would like to develop some of the skills and abilities of my instructor in this course.	B	.56607
In this class, I felt sure that I was learning the important things in this field.	B	.55259
Alternative items:		
I can state the general principles, rules, or formulas presented in this course.	RB	.42318
Synthetic Thinking		
I have an increased understanding of the importance of this field for solving human problems.	B	.61763
I was able to evaluate major theories or new ideas using well thought-out criteria.	B	.47734
In this class, I was able to generate hypotheses (ideas, explanations) to explain new phenomena.	B	.56261
In this class, I was able to make generalizations based on facts that I learned.	B	.59092
In this course I was able to seek explanations for what I observed in nature.	B	.44371
Alternative items:		
In this course, I was able to explore how the subject matter could be applied or utilized in other situations.	B	.40783
I can formulate opinions in this class based on diverse sources of information.	B	.40115
In this case, I was able to integrate the facts I learned into a larger perspective of the field.	N	

* A = Form A, SLS; B = Form B, SLS, R = rewritten; N = new item.

Analytic Thinking	Source	Load
In this course I have come to recognize the importance of the scientific method as a procedure for learning about the world.	A	.56344
I am able to use graphs, charts, and other kinds of tables to interpret events and relationships in this field.	A	.69949
I could figure out the steps necessary to solve most of the problems in this course.	A	.47951
I can analyze theories in this field based on their logical consistency and support from data.	A	.62174
I am able to propose ways of testing new ideas or hypotheses as a result of this class.	RA	.41829
Alternative items:		
As a result of this course, I have become more skilled at identifying what is needed to back up my ideas (arguments).	N	
I have become more skillful in checking the consistency of hypotheses or ideas with given information or assumptions.	N	
I've become more skilled in recognizing the important and unimportant details in my texts.	N	
Problem Solving		
In this class I increased my skill in using mathematical procedures to solve problems.	B	.42713
In this course I developed technical skills which helped me to solve problems.	B	.50729
Alternative items:		
The skills I've developed in this course have been of no use to me in solving new problems.	N	
I've become more skillful in designing strategies for solving problems in this field.	N	
I've become more skillful in recognizing when problem solving strategies I know apply to new situations.	N	

Note: Should problem solving be combined with analytic thinking in one factor?

	Social Learning	Source	Load
	I've come to appreciate how different people learn in this class.	A	.58780
	I've become more comfortable working with other members of this class.	A	.53845
	I have developed a greater awareness of other people's values in this class.	A	.59037
	Working with other students in this class has been an important part of my learning experience.	A	.67539
	I have developed a sense of community with other students in this class.	B	.54702
	I felt free to discuss topics with the other students in this class.	B	.55475
	I have enjoyed learning from the other students in this class.	B	.60940
	Alternative items:		
	I was able to work effectively with other people in this course.	B	.62446
	In this class I have come to value open communication between people.	A	.64731
	Academic Skill Development		
	I've learned to read text and reference material very carefully in this class.	A	.44134
	I was able to summarize the material I learned in this course in written essays, reports, etc.	A	.43874
	I have further developed my writing skills in this class.	A	.53437
or	In this class, I was able to write essays (papers, reports) which expressed my thoughts clearly and precisely.	B	.57920
	When writing a report for this class, I had difficulty organizing the material logically.	RB	.51630
	I was able to use the library effectively to help me with my class project or term report.	RB	.42306
	In this class, I've become more skilled at backing up my arguments with data and/or documentation.	B	.42102

Receptivity to New Ideas/Liberal Learning	Source	Load
When controversial issues were presented, I understood the opposing viewpoints and their implications.	A	.54852
In this class I learned things which challenged my values and made me think about my point of view carefully.	A	.57010
Additional Items:		
I feel that I am more willing to explore new fields as a result of this course.	N	
I find myself more receptive to new ideas as a result of this class.	N	
I am more open to understanding other people's points of view as a result of my experiences in this course.	N	
I am more willing to challenge traditional ideas and standards as a result of this class.	N	
Content Relevancy		
I understand how this subject matter applies to the real world.	RA	.61974
What I learned in this course was trivial and unimportant.	A	.61676
I understood the objectives of this course.	RA	.65312
I've learned practical things in this course which (will) apply directly to my work.	RA	.52953
I do not plan to take more courses in this field.	A	.52480
Alternative Items:		
I wasn't able to use things I already knew to help me learn new material.	A	.48853
I do not understand how this course relates to others in the same department.	A	.39648
Appropriateness of Teaching Method		
I was able to follow instructions accurately for class assignments and exams.	A	.62637
I felt that the teaching method in this course was appropriate for me as a learner.	A	.59090

	Appropriateness of Teaching Method (continued)	Source	Load
	I thought that the relationships between the course objectives, content covered, and evaluation procedures were logical and consistent.	A	.67626
	I was able to follow the presentations in class and could describe the main points in my own words.	A	.53503
or	I found the instructor's presentations clear and at a level appropriate for me.	A	.60298
or	I was uncomfortable with the level of the instruction in this course.	B	.53411
	I did not understand the text books.	B	.50164
	I found the questions the instructor asked difficult to understand.	B	.59108
	Alternative Items:		
	I was able to study effectively for this course.	A	.59301
	My achievements in this course satisfy me.	A	.50471
	I was unsure of what I was supposed to accomplish in this course.	B	.50159
	I did not recognize when my work met the requirements of the tasks in this class.	B	.40712
	Enthusiasm for Learning		
	I was very interested in the information presented in this class.	B	.46290
or	I was eager to learn more about the subject.	B	.55175
	I was not motivated to work in this class.	B	-.51107
	I was rarely bored in this course.	B	
	My intellectual curiosity was stimulated in this course.	RB	.64146
	Alternative Item:		
	My interest in the subject led me to do a lot of outside reading or other extra work to learn more about it.	B	.44241

Appendix E

Stage V Version of the SLS

Student Learning Scales

Instructions: Indicate the extent to which each of the following statements describes your learning experience in this course. If a statement was almost never true of you, you strongly disagree that it describes your experience, or it does not apply to your course, mark a "1" on the answer sheet beside the number of that statement. If it was sometimes true of you, mark a "2" on the answer sheet. If it was frequently true of you and you agree that it describes your learning experience, mark a "3". If it was often true of you, mark a "4". If the statement was nearly always or usually true of you and you strongly agree that it describes your learning experience, mark a "5" on the answer sheet.

Not Applicable or Rarely True	Sometimes True	Frequently True	Often True	Nearly Always True
1	2	3	4	5
Strongly Disagree		Agree		Strongly Agree

Remember that there are no right or wrong learning experiences. Each student and each course is unique and what you learn and how you learn may vary in different courses. Be sure to mark what is true of you in this course.

Student Learning Scales

1. I felt I gained a solid mastery of the factual content of the subject in this course.
2. I could recall principles, generalizations, classifications, and theories that have been presented in this course.
3. I knew what I was attempting to accomplish in this course.
4. In this course, I was able to recognize the varied ways by which other people learn.
5. In this course, I came to recognize the characteristics of some of the major college teaching methods.
6. After reading the assigned material, I could easily summarize the main points.
7. When controversial issues were presented, I understood the opposing viewpoints and their implications.
8. I was able to follow the presentations in class and could describe the main points in my own words.
9. My intellectual curiosity was greatly stimulated in this course.
10. I developed skills in this course which I can apply to other courses (examples: writing a bibliography, organizing information, setting up an experiment).
11. I was able to use things I'd already learned to help me learn new material.
12. My interest in the subject led me to do a lot of outside reading or other extra work to learn more about it.
13. I could figure out the steps necessary to solve most of the problems in this course.
14. I understood the relationships between the various parts or units of this course.
15. In this course, I began to recognize how my learning style interacts with my instructor's teaching style to affect the way I learn.
16. In this class, I was able to generate hypotheses (ideas, explanations) to explain new phenomena.
17. I was able to develop my creative abilities in this class.
18. I have increased my knowledge of terms and definitions in this course.
19. I could place facts learned in this class into a broader picture.
20. In this class, I was able to write essays (papers, reports) which expressed my thoughts clearly and precisely.
21. I was able to use course material and experiences to improve my problem solving and decision making skills.
22. In this course, I developed strategies which help me learn in courses I don't particularly like.

23. I recognized when my work met the requirements of the tasks in this class.

24. In this course, I discovered for myself new ideas or principles.

25. I was able to evaluate major theories or new ideas using well thought-out criteria.

26. I have enjoyed learning from the other students in this class.

27. In this course, I learned to adapt my learning strengths and weaknesses to new situations.

28. I felt that I made significant gains in thinking clearly and logically in this course.

29. In this class I became more skilled in evaluating courses based on how useful they are to me now and how they may help me with future work.

30. I have developed a greater awareness of other people's values in this class.

31. I was aware of myself as an active learner in this course.

32. I have discussed my learning experiences in this class with other people.

33. I understood the major objectives of this course.

34. I was eager to learn more about the subject in the course.

35. I have further developed my sense of self-reliance in this course.

36. When a course is taught in a way I don't like, I could think of ways to modify my learning strategy to meet the situation.

37. After taking this course, I more fully appreciate subject areas which are new to me.

38. I was aware in this course that I react differently to different instructors.

39. In this course, I have developed very positive expectations about my future learning experiences in college.

40. After taking this course, I feel more comfortable choosing courses and/or instructors for future semesters.

41. I was very attentive in this class.

42. I have developed a sense of community with other students in this class.

43. I developed successful strategies for studying for and taking the tests in this course.

44. Understanding my strengths and weaknesses in different learning situations made me feel good about myself.

45. I was able to effectively plan my time to accomplish all that I had to do in this class.

46. I made great gains in conceptual understanding in this course.

47. I was able to function as an independent learner in this class.

48. After taking this class, I am more likely to withhold my initial judgments about my instructors' teaching methods until I understand their reasons for using them.

49. I felt continually challenged to do my best in this class.

50. I have tried to persuade other students to take this course.

51. I've become more analytical about the teaching methods my instructors use.

<u>The following items are for students enrolled in Learning Analysis only</u>:

On the basis of the cognitive style tests you have taken and your experience in Learning Analysis, would you identify yourself as

52. (choose one of the following)

    (1) a field dependent learner
    (2) a field independent learner
    (3) somewhere in between field dependent and independent.

53. (choose one of the following)

    (1) having an external locus of control
    (2) having an internal locus of control
    (3) somewhere in between an external and an internal locus of control.

54. Do you usually prefer learning situations where you are (choose one of the following)

    (1) in a large group of students all studying the same material together with an instructor providing direction and feedback,
    (2) in a small group where students interact and help shape the class direction as part of the learning process,
    (3) responsible for setting your own goals and pace on your own or with occasional consultation with an instructor.